

**CLAIMS**

1. An apparatus for investigating the wall of a borehole in a geological formation, the apparatus comprising:

5       - a pad having an inside face and an outside face for pressing against the wall of the borehole;

      - a set of measurement electrodes mounted on the outside face of the pad and means for measuring the potential difference between two measurement electrodes;

10       - both a source electrode adapted to inject current into the formation and a return electrode, the set of measurement electrodes being situated between the source electrode and the return electrode;

15       characterized in that said pad further comprises shielding means which are arranged between the source electrode and the measurement electrodes and between the measurement electrodes and the return electrode, said shielding means being flush with or almost flush with the outside face of the pad.

2. Apparatus according to claim 1, wherein the pad itself constitutes the shielding means, said pad being made of electrically conductive material.

20       3. Apparatus according to claim 2, further comprising electrically insulating inserts arranged in the pad around each of the source, return and measurement electrodes.

4. Apparatus according to claim 3, wherein the outside face of the conductive pad is electrically insulated from the formation by insulating means.

25       5. Apparatus according to claim 4, wherein the insulating means comprise an insulating layer of non conductive material, said layer covering the outside face of the pad.

6. Apparatus according to claim 4, wherein the insulating means comprise spacer means that maintain a standoff between the outside face of the pad and the borehole wall.

7. Apparatus according to claim 1, wherein the pad is made of electrically non conductive material and the shielding means comprise electrically conductive sheets that are arranged inside said pad such that said conductive sheets are almost flush with the outside face of said pad.
- 5 8. Apparatus according to claim 7, wherein the electrically conductive sheets comprise first sheets that face each of the current, return and measurement electrodes and are molded on or adjacent to the inside face of the pad and second sheets that are molded almost flush with the outside face of the pad, said first and second sheets being connected to each others.
- 10 9. Apparatus according to claim 7, wherein the shielding means comprise a first sheet that covers the inside face of the pad and second sheets that are almost flush with the outside face of the pad.
10. Apparatus according to claim 9, wherein the recesses between the second sheets and the outside face of the pad are filled with a non-conductive material.
- 15 11. Apparatus according to any one of the preceding claims, wherein the shielding means are held at a potential close to that of the formation.
12. Apparatus according to any of the preceding claims, wherein the pad electrically contacts the formation through a conductive wear plate that is situated on the outside face of said pad.
- 20 13. Apparatus according to any one of the preceding claims, wherein the inside face of the pad is attached to a metallic base such that a cavity remains between said base and inside face of the pad, said cavity being adapted to receive electronic means for processing signals coming from the measurement electrodes.
- 25 14. Method for investigating the wall of a borehole in a geological formation wherein a borehole filled with non-conductive mud passes, the method comprising:
- pressing a pad against the borehole wall, said pad comprising a current electrode and a return electrode;

- injecting a current into the formation via said current electrode and said return electrode between which a potential is applied;
- measuring the potential difference between at least two measurement electrodes situated on the pad between the source electrode and the return electrode, said potential difference being representative of the formation resistivity;

characterized in that said method further comprises shielding the measurement electrodes such that the electric field generated by the current and return electrodes is eliminated or almost eliminated in the pad and in the vicinity of the measurement electrodes.